

# The Economic Importance of Higher Education in Central Missouri



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**LOCAL-REGIONAL-STATE ECONOMIC MODELING SYSTEM**

**LRS-0201-1**



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## Key Findings

Higher education is an important part of any regional economy because it contributes to a highly skilled labor force. However, institutions of higher education do not just play an ancillary role in economic development. In many communities, colleges and universities are integral components of the local economy. Because of this, local and state decision makers need to know how employment changes in higher education affect the local and regional economy. This report will assist in planning for changes in higher education employment, should they arise.

In 2000, there were 8,851 people employed in private and public higher educational institutions in central Missouri; and 3,286 people employed in hospitals affiliated with these institutions. Taken together, this direct impact of 12,137 jobs created an additional 10,303 ancillary jobs in Missouri's economy - for a total impact of 22,440 jobs statewide. This impact accounted for 0.4% of Missouri's gross state product (GSP).

As expected, the majority of jobs dependent on higher education in central Missouri were located in the Central Region. The direct impact of 12,137 higher education jobs in central Missouri created an additional 7,003 ancillary jobs - for a total impact of 19,140 jobs in the Central Region. The impact accounted for 5.2% of the central Missouri's gross regional product (GRP).

Any loss of higher education jobs in central Missouri has long-term negative economic impacts. For instance, the loss of 100 higher education jobs in 2000 would result in the loss of 60 ancillary jobs in the Central Region - for a total loss of 160 jobs and \$5.17 million in wages across the region. By 2010, the region's economy continues to decline, with the loss of 165 jobs and \$6.11 million in wages.

The loss of higher education jobs in central Missouri has long-term negative economic impacts for the state's economy. The loss of 100 higher education jobs in 2000 in the Central Region would result in the loss of 87 ancillary jobs in the state economy - for a total loss of 187 jobs and \$6.05 million in wages across Missouri. By 2010, there is very little recover in the state economy, with the loss of 184 jobs and \$6.78 million in wages.

Two other regions are also moderately affected by the loss of 100 higher education jobs in central Missouri. The St. Louis Metro Region would experience a loss of 7 jobs and \$286,100 wages in 2000; and Kansas City would experience a loss of 6 jobs and \$199,300 wages in 2000. However, by 2010 both regions regain almost half of these job losses, indicating a moderate recovery.

The significant of this report is that it allows local and regional decision makers to assess employment changes in their community. Using the information contained within, various scenarios can be computed to approximate the economic impact of changes in higher education employment. An application of this type of analysis is applied to the loss of 60 jobs at University of Missouri Health Care in Boone County.

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## I. Overview

Higher education is an important part of any regional economy because it contributes to a highly skilled labor force. This aspect is particularly significant in today's New Economy, where knowledge-based industries (information technology, life sciences, finance, etc.) are growth sectors that produce high wages. However, institutions of higher education do not just play an ancillary role in economic development. In many communities, colleges and universities are integral components of the local economy. Because of this, local and state decision makers need to know how employment changes in higher education affect the local and regional economy. Therefore, this report examines the economic importance of higher education institutions in central Missouri. The central region was chosen because it has a large concentration of private and public post-secondary institutions.

The economy of central Missouri is in many cases well ahead of the economy of Missouri as a whole. There has been a good amount economic growth in this region during the last ten years, with Boone County leading the way. The population growth since 1990 in the Central Region was 9.7%, compared to 6.7% for the state. The poverty rate for this area is 9.8%, compared to 12.4% for the state as a whole. The unemployment rate during 1999 for the Central Region was a phenomenal 2.2%, much lower than the state rate of 3.4%. Growth in per capita income in the central Missouri over the past decade has surpassed the state growth rate. However, per capita income in the region was only \$23,347 during 1998, compared with \$25,150 for the state.



## II. Methods

The economic impact of higher education in central Missouri is analyzed using input-output models and structural models. Higher education employment data is taken from the Integrated Post-Secondary Education Data System (IPEDS), collected by the Missouri Department of Higher Education. Data indicates full-time faculty, professional and support staff.

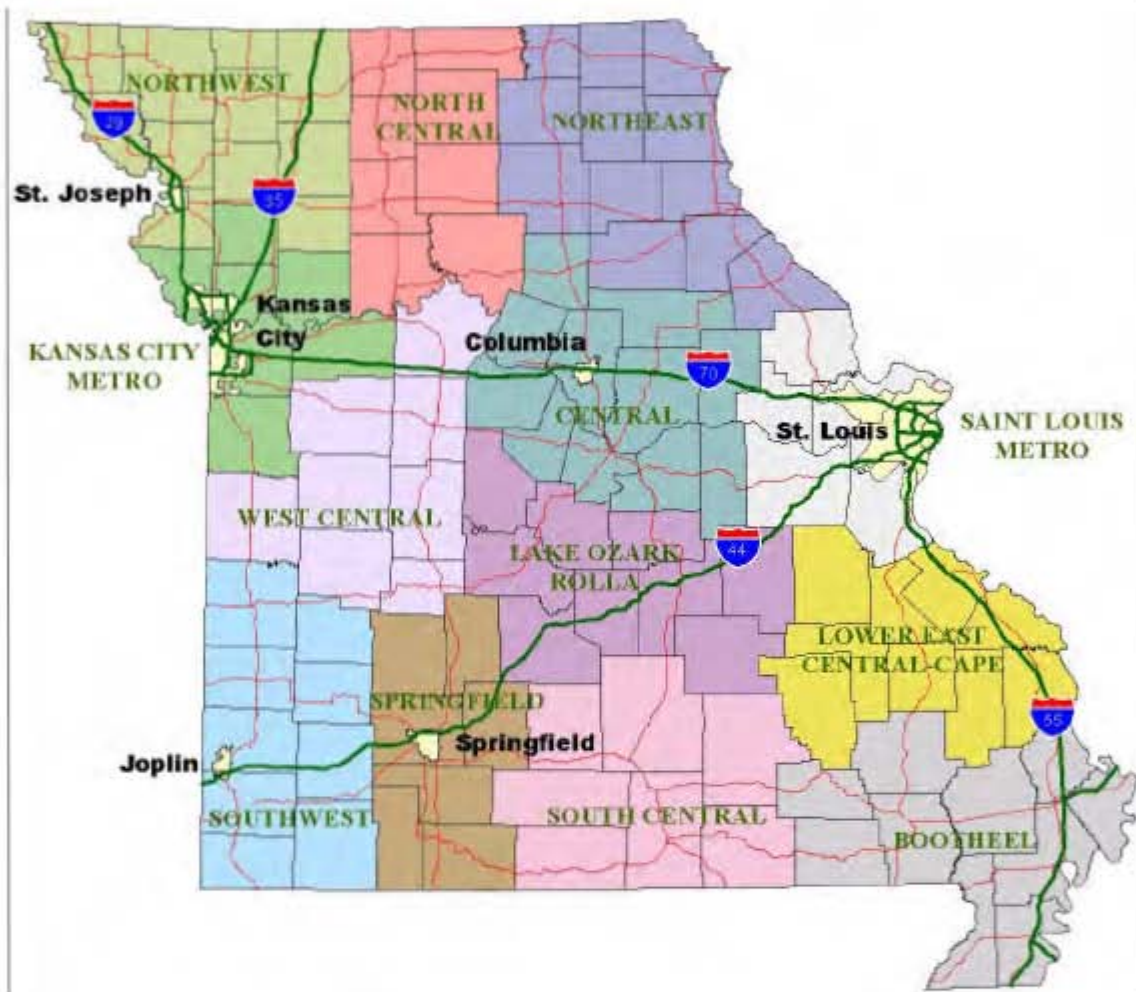
The higher education economic sector is formally defined according to Standard Industry Classifications (SICs). Employment at four-year colleges and universities is classified under SIC 8221 (Colleges, Universities, and Professional Schools). Employment in two-year community colleges and technical schools is classified under SIC 8222 (Junior Colleges and Technical Institutes). Employment in hospitals and clinics associated with a four-year college or university is classified under SIC 806 (Hospitals).

The IMPLAN **input-output model** is utilized to estimate the economic impacts of higher education in Missouri. IMPLAN is a well-established input-output model that examines the economic relationships among businesses, and between businesses and consumers. The model estimates how changes in one or several economic sectors affects an entire economy. IMPLAN derives three types of economic effects that permit one to assess the impact of higher education: *direct effects* are economic impacts directly attributable to higher education; *indirect effects* are business-to-business economic impacts; and *induced effects* are business-to-consumer and household expenditure economic impacts (spending of discretionary income by employees). While IMPLAN is a powerful tool in examining economic changes at the local level, it is limited in that it cannot predict long-term effects. It only offers a snapshot of an area's economy at one point in time, and is therefore relatively static.

The REMI Missouri Multi-Regional **structural model** is utilized to forecast economic impacts at the regional and state level. REMI is a comprehensive economic forecasting and policy analysis model. The model incorporates a complete economic history of the state and forecasts data specific to Missouri. The model also has thousands of policy variables that can be used to show the effects of a broad range of economic development policies. The dynamic structure of the model provides the capability to evaluate tax and other changes that affect costs as an aspect of these policies. The dynamic properties of the model also show medium and long-term effects, in addition to short-term effects, on the economy of Missouri. Further, REMI is able to forecast economic impacts for Missouri's 15 economic regions. Map 1 shows the economic regions within the state that comprise the REMI Missouri Multi-Regional Model.



**Map 1**  
**REMI Missouri Multi-Regional Model**  
**Economic Regions**

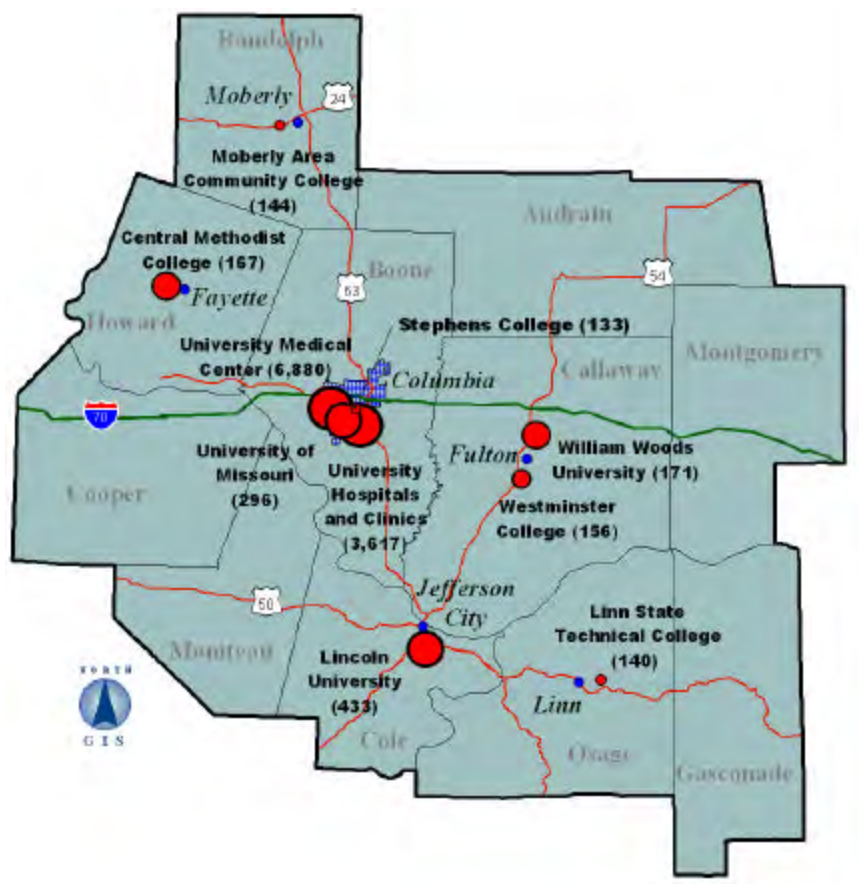


### III. County Impacts

In central Missouri, there are 9 institutions of higher education, of which four are public institutions and five are private institutions. Two of the public institutions are two-year colleges or technical institutes. All of the eight four-year institutions grant some type of graduate degree. Both of Missouri's Land Grant Universities (LGUs) are located in central Missouri - the University of Missouri (1862 LGU) and Lincoln University (1890 LGU). Refer to Map 2.

In order to better estimate the economic impact of higher education at the county-level, institutions were assigned to different industries based on their main function. Using the industries delineated by IMPLAN, the following industry sectors were used: public universities and colleges were assigned to the *State and Local Government - Education* sector; private universities and colleges were assigned to the *Colleges, Universities, Schools* sector; and university-affiliated hospitals were assigned to the *Hospitals* sector.

**Map 2**  
**Location of Higher Education Institutions in Central Missouri**



## Boone County

In 2000, there were 10,926 higher education sector jobs in Boone County. This direct impact created an additional 5,443 ancillary jobs in Boone County - for a total impact of 16,370 jobs. Most higher education jobs in Boone County are in public institutions. For example, 65.9% are employed in public academic institutions earning an average wage of \$39,376 per job; 30.1% are employed in hospitals associated with public institutions earning an average wage of \$32,107 per job; and 3.9% are employed in private institutions earning an average wage of \$19,256 per job. There are four higher educational institutions in Boone County: Columbia College (55 faculty at \$40,506 per job and 241 staff at \$13,172 per job), Stephens College (60 faculty at \$31,270 per job and 73 staff at \$13,172 per job), University of Missouri Hospital and Clinics (3,286 staff at \$34,868 per job), and the University of Missouri-Columbia (2,542 faculty at \$62,883 per job and 4,669 staff at \$26,577 per job)<sup>1</sup>.

Business-to-business economic impacts (indirect effects) attributable to higher education employment were concentrated in Services (404 jobs earning \$18,362 per job), Trade (84 jobs earning \$21,207 per job), and Finance, Insurance and Real Estate (57 jobs earning \$15,230 per job). These are goods and services purchased by higher education institutions from other businesses in Boone County.

Business-to-household economic impacts (induced effects) attributable to higher education employment were concentrated in Trade (2,099 jobs earning \$14,077 per job), Services (1,498 jobs earning \$21,210 per job), Finance, Insurance and Real Estate (323 jobs earning \$26,239 per job), and Transportation, Communications and Public Utilities (184 jobs earning \$29,509 per job). These are goods and services purchased by households that have one or more members employed by higher education institutions.

Apart from higher education, several other sectors experienced a positive economic impact. The Services sector experienced an increase of 2,183 jobs with an average wage of \$20,604. The Trade sector also experienced an increase of 1,902 jobs with an average wage of \$14,352. For both sectors, most jobs were created through the spending of discretionary and wage income by employees. Although the employment impact was greatest in these sectors, the average wage per job was quite low - indicating a moderate overall economic impact.

Additionally, several other sectors experienced smaller job increases, but the average wage of those jobs was high. The Government sector experienced an increase of only 79 jobs, but the average wage per job was \$59,897. The Manufacturing sector experienced an increase of 85 jobs with an average wage of \$28,381. It appears that the Mining sector was least affected by higher education employment in Boone County, indicating that it is not closely allied with higher education. Refer to Tables 1 and 2.

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<sup>1</sup> Faculty and staff salary data estimated from Missouri Dept. of Higher Education and IMPLAN.



**Table 1**  
**Higher Education Employment in Boone County, 2000**  
Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	429	1	32	462
Higher Education - Public	7,211	0	0	7,211
Hospitals	3,286	0	267	3,553
Agriculture	0	17	48	65
Construction	0	43	92	135
Finance, Insur & Real Estate	0	57	323	380
Government	0	15	64	79
Manufacturing	0	16	69	85
Mining	0	0	0	0
Services	0	404	1,498	1,902
Transport, Comm. & Public Utilities	0	36	184	220
Trade	0	84	2,099	2,183
Other	0	0	95	95
<b>TOTAL</b>	<b>10,926</b>	<b>674</b>	<b>4,769</b>	<b>16,370</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 1**  
**Higher Education Wages in Boone County, 2000**  
Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	8,261,000	18,728	608,194	8,887,923
Higher Education - Public	283,937,024	0	0	283,937,024
Hospitals	105,503,704	13,600	8,564,521	114,081,824
Agriculture	0	133,230	285,829	419,059
Construction	0	1,006,117	2,099,996	3,106,113
Finance, Insur & Real Estate	0	863,529	8,472,561	9,336,090
Government	0	1,490,663	3,241,213	4,731,876
Manufacturing	0	521,067	1,891,333	2,412,400
Mining	0	959	5,670	6,630
Services	0	7,423,765	31,771,996	39,195,760
Transport, Comm. & Public Utilities	0	1,048,774	5,426,736	6,475,510
Trade	0	1,785,617	29,548,376	31,333,994
Other	0	0	748,890	748,890
<b>TOTAL</b>	<b>397,701,728</b>	<b>14,306,049</b>	<b>92,665,315</b>	<b>504,673,092</b>

Source: Research and Planning, MO Dept. of Economic Development

As demonstrated above, colleges and universities are integral components of the local economy in Boone County. Because of this, local and state decision makers need to know how employment changes in higher education affects the local economy. One method to assess this is to conduct an impact scenario assuming the gain/loss of 25 higher education jobs in Boone County, proportionally distributed across institutions - 16 in public institutions, 8 in hospitals and 1 in private institutions. This permits one to see how growth or decline of higher education jobs impacts various sectors of the local economy. The results presented below are additive, meaning that they can be summed to approximate various growth/loss scenarios. For example, to assess the gain of 100 higher education jobs you can multiply the results by a factor of four (since it is a gain of jobs, change the sign to positive).

The gain/loss of 25 higher education jobs in Boone County, earning an average wage of \$36,245 per job, would result in the gain/loss of 13 ancillary jobs in the economy - for a total gain/loss impact of 38 jobs in Boone County. The majority of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a gain/loss of 11 jobs earning \$19,273 per job in business-to-household transactions (induced effects). Also, there would be a gain/loss of 2 jobs earning \$17,359 per job in business-to-business transactions (indirect effects).

Apart from higher education, two ancillary economic sectors would be most significantly affected by the direct gain/loss of 25 higher education jobs. The Trade sector would experience a gain/loss of 5 jobs with an average wage of \$14,388. Also, the Services sector would experience a gain/loss of 4 jobs with an average wage of \$22,676. Although the employment impact was greatest on these sectors, the average wage per job was quite low in the Trade sector - indicating a moderate overall economic impact. Refer to Tables 3 and 4.

**Table 3**  
**Projected Employment Impacts of Higher Education in Boone County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	± 1	0	0	± 1
Higher Education - Public	± 16	0	0	± 16
Hospitals	± 8	0	± 1	± 9
Agriculture	0	0	0	0
Construction	0	0	0	0
Finance, Insur & Real Estate	0	0	± 1	± 1
Government	0	0	0	0
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	± 1	± 3	± 4
Transport, Comm. & Public Utilities	0	0	0	± 1
Trade	0	0	± 5	± 5
Other	0	0	0	0
<b>TOTAL</b>	<b>± 25</b>	<b>± 2</b>	<b>± 11</b>	<b>± 38</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 4**  
**Projected Wage Impacts of Higher Education in Boone County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	± 19,256	± 46	± 1,391	± 20,693
Higher Education - Public	± 630,009	0	0	± 630,009
Hospitals	± 256,856	± 33	± 19,594	± 276,484
Agriculture	0	± 324	± 654	± 978
Construction	0	± 2,421	± 4,804	± 7,225
Finance, Insur & Real Estate	0	± 2,097	± 19,384	± 21,481
Government	0	± 3,625	± 7,415	± 11,041
Manufacturing	0	± 1,265	± 4,327	± 5,592
Mining	0	± 2	± 13	± 15
Services	0	± 18,015	± 72,689	± 90,704
Transport, Comm. & Public Utilities	0	± 2,548	± 12,416	± 14,964
Trade	0	± 4,340	± 67,602	± 71,942
Other	0	0	± 1,713	± 1,713
<b>TOTAL</b>	<b>± 906,121</b>	<b>± 34,717</b>	<b>± 212,004</b>	<b>± 1,152,842</b>

Source: Research and Planning, MO Dept. of Economic Development

## Callaway County

In 2000, there were 327 higher education sector jobs in Callaway County. This direct impact created an additional 76 ancillary jobs in Callaway County - for a total impact of 403 jobs. All higher education jobs in Callaway County are in private institutions, earning an average wage of \$22,627 per job. There are two higher educational institutions in Callaway County: Westminster College (50 faculty at \$42,069 per job and 106 staff at \$14,347 per job) and William Woods University (53 faculty at \$39,276 per job and 118 staff at \$14,347 per job)<sup>2</sup>.

Business-to-business economic impacts (indirect effects) attributable to higher education employment were concentrated in Construction (6 jobs earning \$29,283 per job), Services (3 jobs earning \$14,506 per job), and Finance, Insurance and Real Estate (2 jobs earning \$11,422 per job). These are goods and services purchased by higher education institutions from other businesses in Callaway County.

Business-to-household economic impacts (induced effects) attributable to higher education employment were concentrated in Trade (29 jobs earning \$12,596 per job), and Services (21 jobs earning \$14,883 per job). These are goods and services purchased by households that have one or more members employed by higher education institutions.

Apart from higher education, several other sectors experienced a positive economic impact. The Trade sector experienced an increase of 30 jobs with an average wage of \$12,762. The Services sector also experienced an increase of 24 jobs with an average wage of \$14,836. For both sectors, most jobs were created through the spending of discretionary and wage income by employees. Although the employment impact was greatest in these sectors, the average wage per job was quite low indicating a small overall economic impact.

Additionally, several other sectors experienced smaller job increases, but the average wage of those jobs was high. The Transportation, Communications and Public Utilities sector experienced an increase of only 3 jobs, but the average wage per job was \$38,097. The Construction sector experienced an increase of 7 jobs with an average wage of \$28,845. The Manufacturing and Government sectors both experienced an increase of only 2 jobs, but the average wage was \$27,209 and \$26,642, respectively. It appears that the Mining and Agriculture sectors were least affected by higher education employment in Callaway County, indicating that it is not closely allied with higher education. Refer to Tables 5 and 6.

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<sup>2</sup> Faculty and staff salary data estimated from Missouri Dept. of Higher Education and IMPLAN.

**Table 5**  
**Higher Education Employment in Callaway County, 2000**  
Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	327	0	1	328
Agriculture	0	0	1	1
Construction	0	6	1	7
Finance, Insur & Real Estate	0	2	5	6
Government	0	1	1	2
Manufacturing	0	1	1	2
Mining	0	0	0	0
Services	0	3	21	24
Transport, Comm. & Public Utilities	0	1	2	3
Trade	0	1	29	30
Other	0	0	1	1
<b>TOTAL</b>	<b>327</b>	<b>13</b>	<b>63</b>	<b>403</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 6**  
**Higher Education Wages in Callaway County, 2000**  
Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	7,399,001	44	32,044	7,431,089
Agriculture	0	899	2,279	3,178
Construction	0	166,915	32,116	199,031
Finance, Insur & Real Estate	0	19,417	85,069	104,485
Government	0	13,991	31,301	45,292
Manufacturing	0	16,303	27,231	43,535
Mining	0	122	39	161
Services	0	43,517	316,998	360,515
Transport, Comm. & Public Utilities	0	22,112	92,178	114,290
Trade	0	16,266	362,760	379,026
Other	0	0	7,176	7,176
<b>TOTAL</b>	<b>7,399,001</b>	<b>299,585</b>	<b>989,192</b>	<b>8,687,777</b>

Source: Research and Planning, MO Dept. of Economic Development



As demonstrated above, colleges and universities are integral components of the local economy in Callaway County. Because of this, local and state decision makers need to know how employment changes in higher education affects the local economy. One method to assess this is to conduct an impact scenario assuming the gain/loss of 25 private higher education jobs in Callaway County. This permits one to see how growth or decline of higher education jobs impacts various sectors of the local economy. The results presented below are additive, meaning that they can be summed to approximate various growth/loss scenarios. For example, to assess the gain of 100 higher education jobs you can multiply the results by a factor of four (since it is a gain of jobs, change the sign to positive).

The gain/loss of 25 higher education jobs in Callaway County, earning an average wage of \$22,627 per job, would result in the gain/loss of 6 ancillary jobs in the economy - for a total gain/loss impact of 31 jobs in Callaway County. The majority of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a gain/loss of 5 jobs earning \$15,125 per job in business-to-household transactions (induced effects). Also, there would be a gain/loss of 1 job earning \$22,904 in business-to-business transactions (indirect effects).

Apart from higher education, two ancillary economic sectors would be moderately affected by the direct gain/loss of 25 higher education jobs. The Services and Trade sectors would experience a gain/loss of 2 jobs each, with an average wage of \$13,781 and \$14,489, respectively. Although the employment impact was greatest on these sectors, the average wage per job was quite low - indicating a small overall economic impact. Refer to Tables 7 and 8.

**Table 7**  
**Projected Employment Impacts of Higher Education in Callaway County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	± 25	0	0	± 25
Agriculture	0	0	0	0
Construction	0	0	0	± 1
Finance, Insur & Real Estate	0	0	0	± 1
Government	0	0	0	0
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	± 2	± 2
Transport, Comm. & Public Utilities	0	0	0	0
Trade	0	0	± 2	± 2
Other	0	0	0	0
<b>TOTAL</b>	<b>± 25</b>	<b>± 1</b>	<b>± 5</b>	<b>± 31</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 8**  
**Projected Wage Impacts of Higher Education in Callaway County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	± 565,673	± 3	± 2,450	± 568,126
Agriculture	0	± 69	± 174	± 243
Construction	0	± 12,761	± 2,455	± 15,216
Finance, Insur & Real Estate	0	± 1,484	± 6,504	± 7,988
Government	0	± 1,070	± 2,393	± 3,463
Manufacturing	0	± 1,246	± 2,082	± 3,328
Mining	0	± 9	± 3	± 12
Services	0	± 3,327	± 24,235	± 27,562
Transport, Comm. & Public Utilities	0	± 1,691	± 7,047	± 8,738
Trade	0	± 1,244	± 27,734	± 28,978
Other	0	0	± 549	± 549
<b>TOTAL</b>	<b>± 565,673</b>	<b>± 22,904</b>	<b>± 75,626</b>	<b>± 664,203</b>

Source: Research and Planning, MO Dept. of Economic Development

## Cole County

In 2000, there were 433 higher education sector jobs in Cole County. This direct impact created an additional 138 ancillary jobs in Cole County - for a total impact of 571 jobs. All higher education jobs in Cole County are in public institutions, earning an average wage of \$33,069 per job. The only institution of higher education in Cole County is Lincoln University, which employs 161 faculty at \$40,471 per job and 272 staff at \$28,687 per job<sup>3</sup>.

Business-to-household economic impacts (induced effects) attributable to higher education employment were concentrated in Trade (66 jobs earning \$14,435 per job), Services (50 jobs earning \$23,628 per job), and Finance, Insurance and Real Estate (11 jobs earning \$27,768 per job). These are goods and services purchased by households that have one or more members employed by higher education institutions.

Apart from higher education, two other sectors experienced a positive economic impact. The Trade sector experienced an increase of 66 jobs with an average wage of \$14,435. The Services sector also experienced an increase of 50 jobs with an average wage of \$23,628. For both sectors, all jobs were created through the spending of discretionary and wage income by employees. Although the employment impact was greatest in these sectors, the average wage per job was quite low indicating a moderate overall economic impact.

Additionally, several other sectors experienced smaller job increases, but the average wage of those jobs was high. The Government and Manufacturing sectors both experienced an increase of only 1 job, but the average wage per job was \$37,596 and \$36,416, respectively. The Transportation, Communications and Public Utilities sector experienced an increase of 5 jobs with an average wage of \$31,475. The Finance, Insurance and Real Estate sector experienced an increase of 11 jobs with an average wage of \$27,768. It appears that the Mining sector is least affected by higher education employment in Cole County, indicating that it is not closely allied with higher education. Refer to Tables 9 and 10.

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<sup>3</sup> Faculty and staff salary data estimated from Missouri Dept. of Higher Education and IMPLAN.

**Table 9**  
**Higher Education Employment in Cole County, 2000**  
Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	433	0	0	433
Agriculture	0	0	1	1
Construction	0	0	1	1
Finance, Insur & Real Estate	0	0	11	11
Government	0	0	1	1
Manufacturing	0	0	1	1
Mining	0	0	0	0
Services	0	0	50	50
Transport, Comm. & Public Utilities	0	0	5	5
Trade	0	0	66	66
Other	0	0	2	2
<b>TOTAL</b>	<b>433</b>	<b>0</b>	<b>138</b>	<b>571</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 10**  
**Higher Education Wages in Cole County, 2000**  
Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	14,319,000	0	0	14,319,000
Agriculture	0	0	5,671	5,671
Construction	0	0	33,736	33,736
Finance, Insur & Real Estate	0	0	302,667	302,667
Government	0	0	30,077	30,077
Manufacturing	0	0	43,699	43,699
Mining	0	0	5	5
Services	0	0	1,183,742	1,183,742
Transport, Comm. & Public Utilities	0	0	144,785	144,785
Trade	0	0	945,474	945,474
Other	0	0	19,836	19,836
<b>TOTAL</b>	<b>14,319,000</b>	<b>0</b>	<b>2,709,693</b>	<b>17,028,693</b>

Source: Research and Planning, MO Dept. of Economic Development

As demonstrated above, colleges and universities are integral components of the local economy in Cole County. Because of this, local and state decision makers need to know how employment changes in higher education affects the local economy. One method to assess this is to conduct an impact scenario assuming the gain/loss of 25 public higher education jobs in Cole County. This permits one to see how growth or decline of higher education jobs impacts various sectors of the local economy. The results presented below are additive, meaning that they can be summed to approximate various growth/loss scenarios. For example, to assess the gain of 100 higher education jobs you can multiply the results by a factor of four (since it is a gain of jobs, change the sign to positive).

The gain/loss of 25 higher education jobs in Cole County, earning an average wage of \$33,069 per job, would result in the gain/loss of 8 ancillary jobs in the economy - for a total gain/loss impact of 33 jobs in Cole County. All of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a gain/loss of 8 jobs earning \$19,556 per job in business-to-household transactions.

Apart from higher education, two ancillary economic sectors would be most significantly affected by the direct gain/loss of 25 higher education jobs. The Trade sector would experience a gain/loss of 4 jobs with an average wage of \$13,647. Also, the Services sector would experience a gain/loss of 3 jobs with an average wage of \$22,782. Although the employment impact was greatest on these sectors, the average wage per job was quite low in the Trade sector - indicating a moderate overall economic impact. Refer to Tables 11 and 12.



**Table 11**  
**Projected Employment Impacts of Higher Education in Cole County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	± 25	0	0	± 25
Agriculture	0	0	0	0
Construction	0	0	0	0
Finance, Insur & Real Estate	0	0	± 1	± 1
Government	0	0	0	0
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	± 3	± 3
Transport, Comm. & Public Utilities	0	0	0	0
Trade	0	0	± 4	± 4
Other	0	0	0	0
<b>TOTAL</b>	<b>± 25</b>	<b>0</b>	<b>± 8</b>	<b>± 33</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 12**  
**Projected Wage Impacts of Higher Education in Cole County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	± 826,732	0	0	± 826,732
Agriculture	0	0	± 327	± 327
Construction	0	0	± 1,948	± 1,948
Finance, Insur & Real Estate	0	0	± 17,475	± 17,475
Government	0	0	± 1,737	± 1,737
Manufacturing	0	0	± 2,523	± 2,523
Mining	0	0	0	0
Services	0	0	± 68,345	± 68,345
Transport, Comm. & Public Utilities	0	0	± 8,359	± 8,359
Trade	0	0	± 54,589	± 54,589
Other	0	0	± 1,145	± 1,145
<b>TOTAL</b>	<b>± 826,732</b>	<b>0</b>	<b>± 156,449</b>	<b>± 983,181</b>

Source: Research and Planning, MO Dept. of Economic Development

## Howard County

In 2000, there were 167 higher education sector jobs in Howard County. This direct impact created an additional 40 ancillary jobs in Howard County - for a total impact of 207 jobs. All higher education jobs in Howard County are in private institutions, earning an average wage of \$21,904 per job. The only institution of higher education in Howard County is Central Methodist College, which employs 60 faculty at \$36,948 per job and 107 staff at \$13,465 per job<sup>4</sup>.

Business-to-business economic impacts (indirect effects) attributable to higher education employment were concentrated in Construction (4 jobs earning \$14,606 per job) and Services (2 jobs earning \$14,985 per job). These are goods and services purchased by higher education institutions from other businesses in Howard County.

Business-to-household economic impacts (induced effects) attributable to higher education employment were concentrated in Trade (15 jobs earning \$9,519 per job), and Services (11 jobs earning \$15,343 per job). These are goods and services purchased by households that have one or more members employed by higher education institutions.

Apart from higher education, several other sectors experienced a positive economic impact. The Trade sector experienced an increase of 15 jobs with an average wage of \$9,797. The Services sector also experienced an increase of 13 jobs with an average wage of \$15,300. The Finance, Insurance and Real Estate sector experienced an increase of 5 jobs with an average wage of \$17,627. In these sectors most jobs were created through the spending of discretionary and wage income by employees. Although the employment impact was greatest in these sectors, the average wage per job was quite low, indicating a small overall economic impact.

Additionally, one other sector experienced a small job increase, but the average wage of that job was high. The Transportation, Communications and Public Utilities sector experienced an increase of only 1 job, but the average wage was \$25,264. It appears that the Agriculture, Manufacturing and Mining sectors were least affected by higher education employment in Howard County, indicating that it is not closely allied with higher education. Refer to Tables 13 and 14.

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<sup>4</sup> Faculty and staff salary data estimated from Missouri Dept. of Higher Education and IMPLAN.

**Table 13**  
**Higher Education Employment in Howard County, 2000**  
 Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	167	0	1	168
Agriculture	0	0	0	0
Construction	0	4	1	5
Finance, Insur & Real Estate	0	1	2	2
Government	0	1	1	1
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	2	11	13
Transport, Comm. & Public Utilities	0	0	1	1
Trade	0	1	15	15
Other	0	0	1	1
<b>TOTAL</b>	<b>167</b>	<b>8</b>	<b>32</b>	<b>207</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 14**  
**Higher Education Wages in Howard County, 2000**  
 Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	3,658,000	14	26,043	3,684,057
Agriculture	0	850	2,126	2,976
Construction	0	59,885	8,584	68,469
Finance, Insur & Real Estate	0	5,398	35,143	40,541
Government	0	4,546	13,322	17,868
Manufacturing	0	2,767	15,677	18,443
Mining	0	27	107	135
Services	0	22,477	168,773	191,250
Transport, Comm. & Public Utilities	0	5,183	22,607	27,790
Trade	0	9,962	139,932	149,894
Other	0	0	4,081	4,081
<b>TOTAL</b>	<b>3,658,000</b>	<b>111,109</b>	<b>436,394</b>	<b>4,205,503</b>

Source: Research and Planning, MO Dept. of Economic Development

As demonstrated above, colleges and universities are integral components of the local economy in Howard County. Because of this, local and state decision makers need to know how employment changes in higher education affects the local economy. One method to assess this is to conduct an impact scenario assuming the gain/loss of 25 private higher education jobs in Howard County. This permits one to see how growth or decline of higher education jobs impacts various sectors of the local economy. The results presented below are additive, meaning that they can be summed to approximate various growth/loss scenarios. For example, to assess the gain of 100 higher education jobs you can multiply the results by a factor of four (since it is a gain of jobs, change the sign to positive).

The gain/loss of 25 higher education jobs in Howard County, earning an average wage of \$21,904 per job, would result in the gain/loss of 6 ancillary jobs in the economy - for a total gain/loss impact of 31 jobs in Howard County. The majority of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a gain/loss of 5 jobs earning \$13,066 per job in business-to-household transactions (induced effects). Also, there would be a gain/loss of 1 job earning \$16,633 in business-to-business transactions (indirect effects).

Apart from higher education, two ancillary economic sectors would be moderately affected by the direct gain/loss of 25 higher education jobs. The Services and Trade sectors would experience a gain/loss of 2 jobs each, with an average wage per job of \$14,315 and \$11,220, respectively. Although the employment impact was greatest on these sectors, the average wage per job was quite low in both sectors - indicating a small overall economic impact. Refer to Tables 15 and 16.

**Table 15**  
**Projected Employment Impacts of Higher Education in Howard County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	± 25	0	0	± 25
Agriculture	0	0	0	0
Construction	0	± 1	0	± 1
Finance, Insur & Real Estate	0	0	0	0
Government	0	0	0	0
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	± 2	± 2
Transport, Comm. & Public Utilities	0	0	0	0
Trade	0	0	± 2	± 2
Other	0	0	0	0
<b>TOTAL</b>	<b>± 25</b>	<b>± 1</b>	<b>± 5</b>	<b>± 31</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 16**  
**Projected Wage Impacts of Higher Education in Howard County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Private	± 547,605	± 2	± 3,899	± 551,506
Agriculture	0	± 127	± 318	± 446
Construction	0	± 8,965	± 1,285	± 10,250
Finance, Insur & Real Estate	0	± 808	± 5,261	± 6,069
Government	0	± 681	± 1,994	± 2,675
Manufacturing	0	± 414	± 2,347	± 2,761
Mining	0	± 4	± 16	± 20
Services	0	± 3,365	± 25,265	± 28,630
Transport, Comm. & Public Utilities	0	± 776	± 3,384	± 4,160
Trade	0	± 1,491	± 20,948	± 22,439
Other	0	0	± 611	± 611
<b>TOTAL</b>	<b>± 547,605</b>	<b>± 16,633</b>	<b>± 65,328</b>	<b>± 629,566</b>

Source: Research and Planning, MO Dept. of Economic Development



## Osage County

In 2000, there were 140 higher education sector jobs in Osage County. This direct impact created an additional 26 ancillary jobs in Osage County - for a total impact of 166 jobs. All higher education jobs in Osage County are in two-year public institutions, earning an average wage of \$29,186 per job. The only institution of higher education in Osage County is Linn State Technical College (a two-year institution), which employs 74 faculty at \$34,419 per job and 66 staff at \$23,324 per job<sup>5</sup>.

Business-to-household economic impacts (induced effects) attributable to higher education employment were concentrated in Trade (11 jobs earning \$13,162 per job) and Services (9 jobs earning \$12,536 per job). These are goods and services purchased by households that have one or more members employed by higher education institutions.

Apart from higher education, two other sectors experienced a positive economic impact. The Trade sector experienced an increase of 11 jobs with an average wage of \$13,162. The Services sector also experienced an increase of 9 jobs with an average wage of \$12,536. For both sectors, all jobs were created through the spending of discretionary and wage income by employees. Although the employment impact was greatest in these sectors, the average wage per job was quite low indicating a small overall economic impact.

Additionally, several other sectors experienced smaller job increases, but the average wage of those jobs was high. The Transportation, Communications and Public Utilities sector experienced an increase of only 1 job, yet the average wage was \$24,486. The Finance, Insurance and Real Estate sector also experienced an increase of only 1 job, yet the average wage was \$23,304. It appears that the Agriculture, Manufacturing and Mining sectors are least affected by higher education employment in Osage County, indicating that it is not closely allied with higher education. Refer to Tables 17 and 18.

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<sup>5</sup> Faculty and staff salary data estimated from Missouri Dept. of Higher Education and IMPLAN.

**Table 17**  
**Higher Education Employment in Osage County, 2000**  
Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	140	0	0	140
Agriculture	0	0	0	0
Construction	0	0	1	1
Finance, Insur & Real Estate	0	0	1	1
Government	0	0	1	1
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	9	9
Transport, Comm. & Public Utilities	0	0	1	1
Trade	0	0	11	11
Other	0	0	1	1
<b>TOTAL</b>	<b>140</b>	<b>0</b>	<b>26</b>	<b>166</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 18**  
**Higher Education Wages in Osage County, 2000**  
Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	4,086,000	0	0	4,086,000
Agriculture	0	0	878	878
Construction	0	0	10,261	10,261
Finance, Insur & Real Estate	0	0	32,626	32,626
Government	0	0	9,683	9,683
Manufacturing	0	0	11,161	11,161
Mining	0	0	12	12
Services	0	0	117,834	117,834
Transport, Comm. & Public Utilities	0	0	31,832	31,832
Trade	0	0	147,416	147,416
Other	0	0	5,745	5,745
<b>TOTAL</b>	<b>4,086,000</b>	<b>0</b>	<b>367,449</b>	<b>4,453,449</b>

Source: Research and Planning, MO Dept. of Economic Development

As demonstrated above, colleges and universities are integral components of the local economy in Osage County. Because of this, local and state decision makers need to know how employment changes in higher education affects the local economy. One method to assess this is to conduct an impact scenario assuming the gain/loss of 25 public higher education jobs in Osage County. This permits one to see how growth or decline of higher education jobs impacts various sectors of the local economy. The results presented below are additive, meaning that they can be summed to approximate various growth/loss scenarios. For example, to assess the gain of 100 higher education jobs you can multiply the results by a factor of four (since it is a gain of jobs, change the sign to positive).

The gain/loss of 25 higher education jobs in Osage County, earning an average wage of \$29,186 per job, would result in the gain/loss of 5 ancillary jobs in the economy - for a total gain/loss impact of 30 jobs in Osage County. All of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a gain/loss of 5 jobs earning \$13,123 per job in business-to-household transactions (induced effects).

Apart from higher education, two ancillary economic sectors would be moderately affected by the direct gain/loss of 25 higher education jobs. The Services and Trade sectors would experience a gain/loss of 2 jobs each, with an average wage per job of \$10,521 and \$13,162, respectively. Although the employment impact was greatest on these sectors, the average wage per job was quite low - indicating a small overall economic impact. Refer to Tables 19 and 20.

**Table 19**  
**Projected Employment Impacts of Higher Education in Osage County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	± 25	0	0	± 25
Agriculture	0	0	0	0
Construction	0	0	0	0
Finance, Insur & Real Estate	0	0	0	0
Government	0	0	0	0
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	± 2	± 2
Transport, Comm. & Public Utilities	0	0	0	0
Trade	0	0	± 2	± 2
Other	0	0	0	0
<b>TOTAL</b>	<b>± 25</b>	<b>0</b>	<b>± 5</b>	<b>± 30</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 20**  
**Projected Wage Impacts of Higher Education in Osage County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	± 729,643	0	0	± 729,643
Agriculture	0	0	± 157	± 157
Construction	0	0	± 1,832	± 1,832
Finance, Insur & Real Estate	0	0	± 5,826	± 5,826
Government	0	0	± 1,729	± 1,729
Manufacturing	0	0	± 1,993	± 1,993
Mining	0	0	± 2	± 2
Services	0	0	± 21,042	± 21,042
Transport, Comm. & Public Utilities	0	0	± 5,684	± 5,684
Trade	0	0	± 26,324	± 26,324
Other	0	0	± 1,026	± 1,026
<b>TOTAL</b>	<b>± 729,643</b>	<b>0</b>	<b>± 65,616</b>	<b>± 795,259</b>

Source: Research and Planning, MO Dept. of Economic Development

## Randolph County

In 2000, there were 144 higher education sector jobs in Randolph County. This direct impact created an additional 42 ancillary jobs in Randolph County - for a total impact of 186 jobs. All higher education jobs in Randolph County are in two-year public institutions, earning an average wage of \$26,979 per job. The only institution of higher education in Randolph County is Moberly Area Community College (a two-year institution), which employs 52 faculty at \$31,360 per job and 92 staff at \$24,501 per job<sup>6</sup>.

Business-to-household economic impacts (induced effects) attributable to higher education employment were concentrated in Trade (19 jobs earning \$13,893 per job) and Services (15 jobs earning \$15,647 per job). These are goods and services purchased by households that have one or more members employed by higher education institutions.

Apart from higher education, two other sectors experienced a positive economic impact. The Trade sector experienced an increase of 19 jobs with an average wage of \$13,893. The Services sector also experienced an increase of 15 jobs with an average wage of \$15,647. For both sectors, all jobs were created through the spending of discretionary and wage income by employees. Although the employment impact was greatest in these sectors, the average wage per job was quite low indicating a small overall economic impact.

Additionally, several other sectors experienced smaller job increases, but the average wage of those jobs was high. The Transportation, Communications and Public Utilities sector experienced an increase of only 1 job, yet the average wage was \$31,787. The Government sector also experienced an increase of only 1 job, yet the average wage was \$27,420. The Finance, Insurance and Real Estate sector experienced an increase of 3 jobs, with an average wage of \$20,439 per job. It appears that the Agriculture, Manufacturing and Mining sectors are least affected by higher education employment in Randolph County, indicating that it is not closely allied with higher education. Refer to Tables 21 and 22.

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<sup>6</sup> Faculty and staff salary data estimated from Missouri Dept. of Higher Education and IMPLAN.



**Table 21**  
**Higher Education Employment in Randolph County, 2000**  
Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	144	0	0	144
Agriculture	0	0	0	0
Construction	0	0	1	1
Finance, Insur & Real Estate	0	0	3	3
Government	0	0	1	1
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	15	15
Transport, Comm. & Public Utilities	0	0	1	1
Trade	0	0	19	19
Other	0	0	1	1
<b>TOTAL</b>	<b>144</b>	<b>0</b>	<b>42</b>	<b>186</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 22**  
**Higher Education Wages in Randolph County, 2000**  
Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	3,885,000	0	0	3,885,000
Agriculture	0	0	2,134	2,134
Construction	0	0	11,575	11,575
Finance, Insur & Real Estate	0	0	65,406	65,406
Government	0	0	19,194	19,194
Manufacturing	0	0	6,710	6,710
Mining	0	0	260	260
Services	0	0	236,272	236,272
Transport, Comm. & Public Utilities	0	0	44,502	44,502
Trade	0	0	262,585	262,585
Other	0	0	7,175	7,175
<b>TOTAL</b>	<b>3,885,000</b>	<b>0</b>	<b>655,813</b>	<b>4,540,812</b>

Source: Research and Planning, MO Dept. of Economic Development

As demonstrated above, colleges and universities are integral components of the local economy in Randolph County. Because of this, local and state decision makers need to know how employment changes in higher education affects the local economy. One method to assess this is to conduct an impact scenario assuming the gain/loss of 25 public higher education jobs in Randolph County. This permits one to see how growth or decline of higher education jobs impacts various sectors of the local economy. The results presented below are additive, meaning that they can be summed to approximate various growth/loss scenarios. For example, to assess the gain of 100 higher education jobs you can multiply the results by a factor of four (since it is a gain of jobs, change the sign to positive).

The gain/loss of 25 higher education jobs in Randolph County, earning an average wage of \$26,979 per job, would result in the gain/loss of 7 ancillary jobs in the economy - for a total gain/loss impact of 32 jobs in Randolph County. All of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a gain/loss of 7 jobs earning \$16,265 per job in business-to-household transactions (induced effects).

Apart from higher education, two ancillary economic sectors would be moderately affected by the direct gain/loss of 25 higher education jobs. The Services and Trade sectors would experience a gain/loss of 3 jobs each, with an average wage per job of \$13,673 and \$15,196, respectively. Although the employment impact was greatest on these sectors, the average wage per job was quite low - indicating a small overall economic impact. Refer to Tables 23 and 24.

**Table 23**  
**Projected Employment Impacts of Higher Education in Randolph County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	± 25	0	0	± 25
Agriculture	0	0	0	0
Construction	0	0	0	0
Finance, Insur & Real Estate	0	0	± 1	± 1
Government	0	0	0	0
Manufacturing	0	0	0	0
Mining	0	0	0	0
Services	0	0	± 3	± 3
Transport, Comm. & Public Utilities	0	0	0	0
Trade	0	0	± 3	± 3
Other	0	0	0	0
<b>TOTAL</b>	<b>± 25</b>	<b>0</b>	<b>± 7</b>	<b>± 32</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 24**  
**Projected Wage Impacts of Higher Education in Randolph County, 2000**  
 Per 25 Job Increase/Decrease. Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Higher Education - Public	± 674,479	0	0	± 674,479
Agriculture	0	0	± 370	± 370
Construction	0	0	± 2,010	± 2,010
Finance, Insur & Real Estate	0	0	± 11,355	± 11,355
Government	0	0	± 3,332	± 3,332
Manufacturing	0	0	± 1,165	± 1,165
Mining	0	0	± 45	± 45
Services	0	0	± 41,019	± 41,019
Transport, Comm. & Public Utilities	0	0	± 7,726	± 7,726
Trade	0	0	± 45,588	± 45,588
Other	0	0	± 1,246	± 1,246
<b>TOTAL</b>	<b>± 674,479</b>	<b>0</b>	<b>± 113,856</b>	<b>± 788,335</b>

Source: Research and Planning, MO Dept. of Economic Development

## IV. Regional and State Impacts

As demonstrated above, higher education comprises an important part of the local economy. However, higher education also has a significant economic impact on the regional and state economy. In 2000, there were 8,851 people employed in private and public higher educational institutions in central Missouri; and 3,286 people employed in hospitals affiliated with these institutions. Using this information, several impact scenarios were conducted to determine how higher education employment in central Missouri affects Missouri's regional and state economies.

In 2000, there were 12,137 higher education sector jobs in the Central Region. This direct impact created an additional 10,303 ancillary jobs in Missouri's economy - for a total impact of 22,440 jobs statewide. This impact accounted for 0.4% of Missouri's gross state product (GSP).

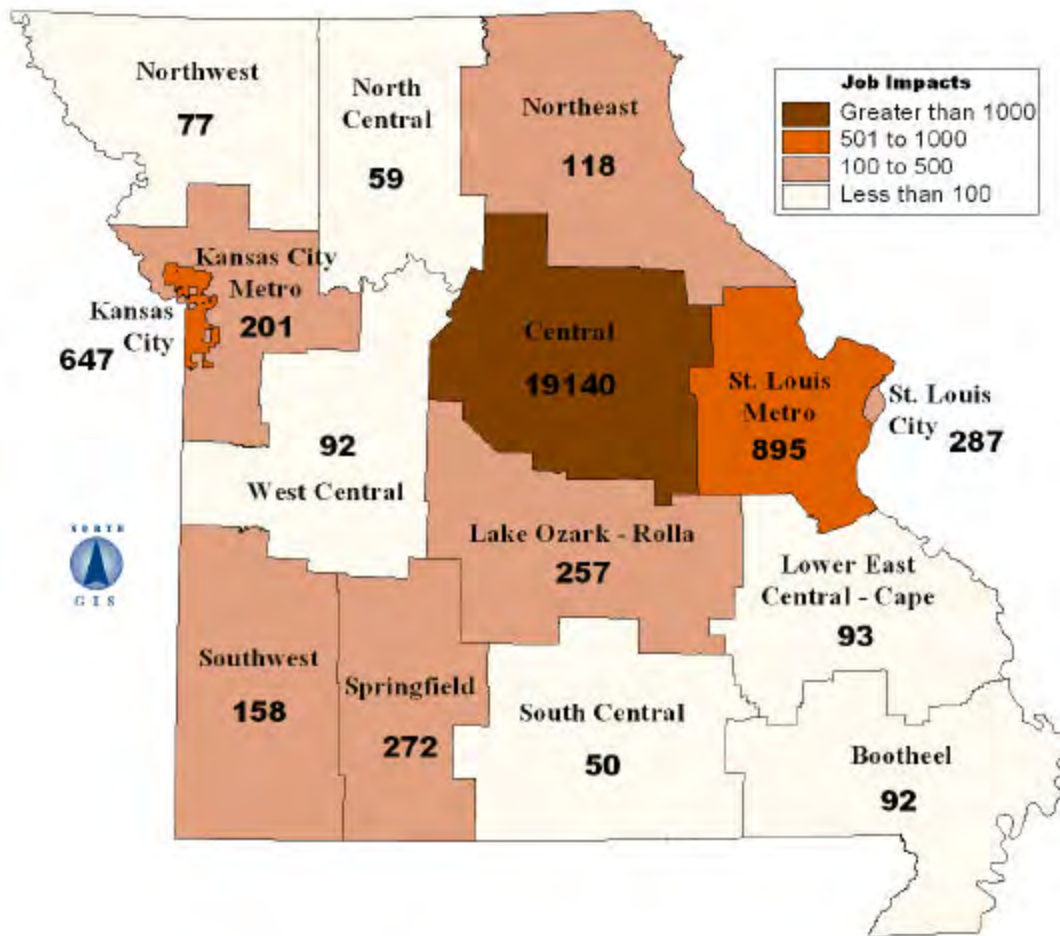
Several economic sectors in the state were positively affected by higher education employment in the Central Region. In the Services sector, there were 15,540 jobs across the state that were dependent on higher education in the Central Region, earning an average wage of \$33,970 per job. Higher education in the Central Region accounted for 1.1% of Services GSP statewide.

In addition, there were 2,833 Retail Trade sector jobs across the state that were dependent on higher education in the central Missouri - earning an average wage of \$15,150 per job. In the Construction sector, there were 1,407 jobs across the state that were dependent on higher education in the Central Region, earning an average wage of \$27,989 per job.

As expected, the majority of jobs dependent on higher education in central Missouri were located in the Central Region. The direct impact of 12,137 higher education jobs in the central Missouri created an additional 7,003 ancillary jobs - for a total impact of 19,140 jobs in the Central Region. The impact accounted for 5.2% of the Central Region's gross regional product (GRP).

Several other regions in the state had significant employment impacts that were attributable to higher education employment in the Central Region. In the St. Louis Metro Region, there were 895 jobs earning an average wage of \$37,810 per job. In the Kansas City, there were 647 jobs earning an average wage of \$36,445 per job. In addition, several other regions had smaller job impacts tied to higher education in central Missouri: St. Louis City had 287 jobs earning \$43,275 per job; the Springfield Region had 272 jobs earning \$23,882 per job; the Lake Ozark-Rolla Region had 257 jobs earning \$22,292 per job; and the Kansas City Metro Region had 201 jobs earning \$31,219 per job. Refer to Map 3 and Tables 25 and 26.

**Map 3**  
**Central Region Higher Education - Employment Impacts by Region**



**Table 25**  
**Impacts of Higher Education in Missouri by Sector, 2000**  
 Difference from baseline projection.

SECTOR	IMPACT		
	Employment	Wages	Percent GRP/GSP
Agriculture, Forestry, Fishing	120	1,473,000	0.36%
Construction	1,407	39,380,000	0.73%
Finance, Insur and Real Estate	641	21,750,000	0.26%
Government	581	NA	0.11%
Manufacturing - Durable	249	19,910,000	0.09%
Manufacturing - Non-Durable	267	15,020,000	0.10%
Mining	20	866,400	0.32%
Services	15,540	527,900,000	1.13%
Trade - Retail	2,833	42,920,000	0.47%
Trade - Wholesale	417	18,000,000	0.23%
Transport, Comm. & Public Utilities	368	19,080,000	0.21%
<b>TOTAL</b>	<b>22,440</b>	<b>706,400,000</b>	<b>0.41%</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 26**  
**Impacts of Higher Education in Missouri by Region, 2000**  
 Difference from baseline projection.

REGION	IMPACT		
	Employment	Wages	Percent GRP/GSP
Bootheel	92	1,828,000	0.09%
Central	19,140	602,200,000	5.24%
Kansas City	647	23,580,000	0.12%
Kansas City Metro	201	6,275,000	0.09%
Lower East Central / Cape Girardeau	93	2,191,000	0.08%
Lake Ozark - Rolla	257	5,729,000	0.18%
North Central	59	1,167,000	0.14%
North East	118	2,680,000	0.14%
North West	77	1,768,000	0.08%
South Central	50	784,200	0.09%
Springfield	272	6,496,000	0.10%
St. Louis	287	12,420,000	0.09%
St. Louis Metro	895	33,840,000	0.08%
South West	158	3,397,000	0.09%
West Central	92	1,976,000	0.10%
<b>MISSOURI</b>	<b>22,440</b>	<b>706,400,000</b>	<b>0.41%</b>

Source: Research and Planning, MO Dept. of Economic Development

As demonstrated above, colleges and universities are integral components of the regional and state economy in Missouri. Because of this, local and state decision makers need to know how employment changes in higher education affects the regional and state economy. One method to assess this is to conduct an impact scenario assuming the loss of 100 higher education jobs in the Central Region, proportionally distributed across institutions - 73 in higher education institutions and 27 in hospitals. This permits one to see how the decline of higher education jobs impacts various sectors of the regional and state economy.

Impacts are ascertained by examining the difference between the baseline projection (no loss of jobs) and the scenario projection (loss of 100 jobs). The differential indicates the number of jobs above or below what would have been expected if no change in the economy had occurred. The results presented below are additive, meaning that they can be summed to approximate various loss scenarios. For example, to assess the loss of 200 higher education jobs you can multiply the results by a factor of two.

The loss of higher education jobs in central Missouri has long-term negative economic impacts. In 2000, the loss of 100 higher education jobs would result in the loss of 60 ancillary jobs in the Central Region - for a total loss of 160 jobs and \$5.17 million in wages across the region. By 2010, the region's economy continues to decline, with the loss of 165 jobs and \$6.11 million in wages.

The Services sector would be most adversely affected, losing 120 jobs (at \$35,392 per job) and \$4.25 million wages in 2000. However, by 2010 there is a small recovery of Services jobs, yet wages continue to fall - with the projected loss of 107 jobs and \$5.3 million in wages. This indicates the rise of low-wage jobs in the Service sector in the Central Region.

The Government sector would experience prolonged job losses over ten years. In 2000, there would only be a loss of 4 Government jobs, yet by 2010 this increases to 33 jobs lost in the Central Region. In addition, the Retail Trade sector would experience a slow recovery. In 2000, the Retail Trade sector would lose 19 low wage jobs (at \$14,847 per job) and \$282,100 in wages. By 2010, the sector recovers slightly, with the loss of 16 jobs and \$301,400 in wages. Refer to Tables 27 and 28.



**Table 27**  
**Projected Employment Impacts of Higher Education**  
**in Central Missouri by Sector, 2000-2010**

Per 100 Job Decrease. Difference from baseline projection.

SECTOR	EMPLOYMENT		
	2000	2005	2010
Agriculture, Forestry, Fishing	-1	0	-1
Construction	-7	-6	-5
Finance, Insur and Real Estate	-4	-3	-3
Government	-4	-25	-33
Manufacturing - Durable	0	1	2
Manufacturing - Non-Durable	-1	0	0
Mining	0	0	0
Services	-120	-110	-107
Trade - Retail	-19	-17	-16
Trade - Wholesale	-2	-1	-1
Transport, Comm. & Public Utilities	-2	-1	-1
<b>TOTAL</b>	<b>-160</b>	<b>-162</b>	<b>-165</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 28**  
**Projected Wage Impacts of Higher Education**  
**in Central Missouri by Sector, 2000-2010**

Per 100 Job Decrease. Difference from baseline projection.

SECTOR	WAGES		
	2000	2005	2010
Agriculture, Forestry, Fishing	-6,657	-8,997	-8,497
Construction	-211,600	-207,800	-186,400
Finance, Insur and Real Estate	-115,500	-129,500	-105,300
Manufacturing - Durable	-67,770	-45,150	-298
Manufacturing - Non-Durable	-55,760	-56,800	-31,800
Mining	-4,686	-3,960	-2,898
Services	-4,247,000	-4,757,000	-5,309,000
Trade - Retail	-282,100	-324,400	-301,400
Trade - Wholesale	-75,700	-92,210	-68,750
Transport, Comm. & Public Utilities	-100,300	-112,400	-92,270
<b>TOTAL</b>	<b>-5,167,000</b>	<b>-5,738,000</b>	<b>-6,107,000</b>

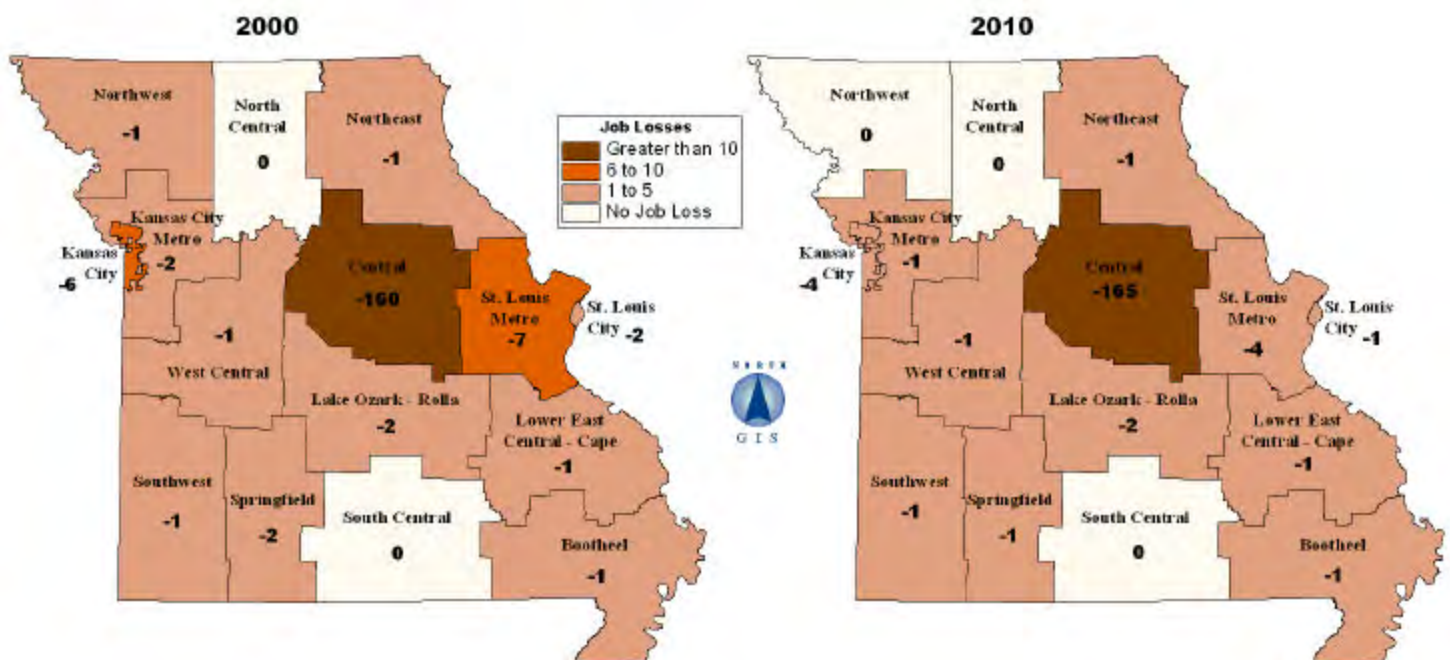
Source: Research and Planning, MO Dept. of Economic Development

The loss of higher education jobs in central Missouri has long-term negative economic impacts throughout the state economy. In 2000, the loss of 100 higher education jobs in the Central Region would result in the loss of 87 ancillary jobs in the state economy - for a total loss of 187 jobs and \$6.05 million in wages across Missouri. By 2010, there is very little recover in the state economy, with the loss of 184 jobs and \$6.78 million in wages.

As expected, the Central Region would be most adversely affected, losing 160 jobs and \$5.17 million wages in 2000. By 2010, the region's economy continues to decline, with the loss of 165 jobs and \$6.11 million in wages.

Two other regions of the state are also moderately affected by the loss of 100 higher education jobs in central Missouri. The St. Louis Metro Region would experience a loss of 7 jobs and \$286,100 wages in 2000; and Kansas City would experience a loss of 6 jobs and \$199,300 wages in 2000. However, by 2010 both regions regain almost half of these job losses, indicating a moderate recovery. Refer to Map 4 and Tables 29 and 30.

**Map 4**  
**Central Region Higher Education Loss Scenario - Employment Losses by Region**  
 Per 100 Job Decrease.



**Table 29**  
**Projected Employment Impacts of Higher Education**  
**in Missouri by Region, 2000-2010**

Per 100 Job Decrease. Difference from baseline projection.

REGION	EMPLOYMENT		
	2000	2005	2010
Bootheel	-1	-1	-1
Central	-160	-162	-165
Kansas City	-6	-4	-4
Kansas City Metro	-2	-1	-1
Lower East Central / Cape Girardeau	-1	-1	-1
Lake Ozark - Rolla	-2	-2	-2
North Central	0	0	0
North East	-1	-1	-1
North West	-1	-1	0
South Central	0	0	0
Springfield	-2	-2	-1
St. Louis	-2	-2	-1
St. Louis Metro	-7	-5	-4
South West	-1	-1	-1
West Central	-1	-1	-1
<b>MISSOURI</b>	<b>-187</b>	<b>-183</b>	<b>-184</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 30**  
**Projected Wage Impacts of Higher Education**  
**in Missouri by Region, 2000-2010**

Per 100 Job Decrease. Difference from baseline projection.

REGION	WAGES		
	2000	2005	2010
Bootheel	-15,620	-13,950	-12,400
Central	-5,167,000	-5,738,000	-6,107,000
Kansas City	-199,300	-183,100	-167,800
Kansas City Metro	-53,410	-41,480	-34,810
Lower East Central / Cape Girardeau	-18,360	-15,740	-14,780
Lake Ozark - Rolla	-49,000	-45,660	-36,950
North Central	-9,924	-9,298	-7,927
North East	-22,830	-20,380	-16,690
North West	-14,900	-13,350	-11,320
South Central	-6,795	-5,960	-5,305
Springfield	-54,360	-48,640	-42,440
St. Louis	-104,000	-83,920	-82,020
St. Louis Metro	-286,100	-213,600	-194,500
South West	-28,850	-24,800	-22,410
West Central	-16,570	-15,500	-13,350
<b>MISSOURI</b>	<b>-6,050,000</b>	<b>-6,485,000</b>	<b>-6,775,000</b>

Source: Research and Planning, MO Dept. of Economic Development

The loss of 100 higher education jobs in central Missouri would result in a -0.044% decrease in the Central Region's gross regional product (GRP). However, by 2010 GRP recovers slightly, resulting in a loss of only -0.039% of GRP. The impact on gross state product (GSP) is negligible, resulting in a -0.003% decrease in GSP in 2000 - which remains steady through 2010. This indicates the loss of 100 higher education jobs in central Missouri has little impact on regional or state economic output. Refer to Table 31

**Table 31**  
**Projected Gross State/Regional Product Impacts of Higher Education, 2000-2010**  
 Per 100 Job Decrease. Difference from baseline projection.

REGION	GROSS STATE/REGIONAL PRODUCT		
	2000	2005	2010
Central GRP	-0.044%	-0.041%	-0.039%
Missouri GSP	-0.003%	-0.003%	-0.003%

Source: Research and Planning, MO Dept. of Economic Development

State tax revenues would also experience sharp decreases in 2000, with individual income tax revenues continuing to fall through 2010. In 2000, individual income tax revenues would fall by \$163,700, with continued declines by 2010; and general sales tax revenues would fall by \$120,300, with some recovery by 2010. Refer to Table 32.

**Table 32**  
**Projected Tax Revenue Impacts of Higher Education in Missouri, 2000-2010**  
 Per 100 Job Decrease. Difference from baseline projection.

SECTOR	STATE TAX REVENUES		
	2000	2005	2010
Individual Income Tax	-163,700	-176,500	-184,100
Corporate Income Tax	-12,690	-10,400	-10,180
General Sales Tax	-120,300	-106,600	-102,500
Motor Fuel Sales Tax	-33,030	-31,940	-32,750

Source: Research and Planning, MO Dept. of Economic Development

Missouri would experience a small decline in population through 2010. In 2000, Missouri would lose 35 people, with over three-quarters coming from the Central Region. By 2010, this decline expands to a loss of 245 people, again with over three-quarters coming from the Central Region. Refer to Table 33.

**Table 33**  
**Projected Population Impacts of Higher Education in Missouri, 2000-2010**  
 Per 100 Job Decrease. Difference from baseline projection.

SECTOR	POPULATION		
	2000	2005	2010
Central Region	-27	-152	-204
Missouri	-35	-187	-245

Source: Research and Planning, MO Dept. of Economic Development

## V. Implications and Summary

Higher education is an important part of any regional economy because it contributes to a highly skilled labor force. This aspect is particularly significant in today's New Economy, where knowledge-based industries (information technology, life sciences, finance, etc.) are growth sectors that produce high wages. However, institutions of higher education do not just play an ancillary role in economic development. In many communities, colleges and universities are integral components of the local economy. Because of this, local and state decision makers need to know how employment changes in higher education affect the local and regional economy. This report will assist in planning for changes in higher education employment at the county, regional and state level - should they arise.

In 2000, there were 8,851 people employed in private and public higher educational institutions in central Missouri; and 3,286 people employed in hospitals affiliated with these institutions. Taken together, this direct impact of 12,137 jobs created an additional 10,303 ancillary jobs in Missouri's economy - for a total impact of 22,440 jobs statewide. This impact accounted for 0.4% of Missouri's gross state product (GSP).

As expected, the majority of jobs dependent on higher education in central Missouri were located in the Central Region. The direct impact of 12,137 higher education jobs in central Missouri created an additional 7,003 ancillary jobs - for a total impact of 19,140 jobs in the Central Region. The impact accounted for 5.2% of central Missouri's gross regional product (GRP).

Any loss of higher education jobs in central Missouri has long-term negative economic impacts. For instance, the loss of 100 higher education jobs in 2000 would result in the loss of 60 ancillary jobs in the Central Region - for a total loss of 160 jobs and \$5.17 million in wages across the region. By 2010, the region's economy continues to decline, with the loss of 165 jobs and \$6.11 million in wages.

The loss of higher education jobs in central Missouri has long-term negative economic impacts for the state's economy. In 2000, the loss of 100 higher education jobs in the Central Region would result in the loss of 87 ancillary jobs in the state economy - for a total loss of 187 jobs and \$6.05 million in wages across Missouri. By 2010, there is very little recover in the state economy, with the loss of 184 jobs and \$6.78 million in wages.

Two other regions are also moderately affected by the loss of 100 higher education jobs in central Missouri. The St. Louis Metro Region would experience a loss of 7 jobs and \$286,100 wages in 2000; and Kansas City would experience a loss of 6 jobs and \$199,300 wages in 2000. However, by 2010 both regions regain almost half of these job losses, indicating a moderate recovery.

## **Case Study: Job Losses at UMHC in Boone County**

On February 9, 2001, officials at University of Missouri Health Care (UMHC) began discussing large job reductions at its facilities in Columbia. Officials estimate that today's cuts could total 300 to 350 jobs, although no official announcement has been made (Columbia Missourian, 9 FEB 2001). UMHC officials state they are in financial trouble because of uncompensated costs from treating Medicaid and uninsured patients - which totals \$53 million. Officials have been looking to the state for help, but with a tight budget assistance may not be forthcoming.

This is not the first round of layoffs for UMHC. On October 19, 2000, the University of Missouri Health Care (UMHC) announced that it would layoff 60 non-unionized workers at its facilities in Columbia. The layoffs were expected to go into effect on December 1, 2000. The Local-Regional-State Economic Modeling System was used to assess the impact these job losses will have on Boone County, central Missouri and across the state.

### **Impacts on Boone County**

The loss of 60 jobs at UMHC in Boone County, earning an average wage of \$32,107 per job, would result in the loss of 38 ancillary jobs in the local economy - for a total loss impact of 98 jobs and \$2.7 million in wages in Boone County. The majority of these ancillary jobs losses would occur in business-to-household transactions (induced effects). There would be a loss of 27 jobs earning \$19,273 per job in business-to-household transactions (induced effects). Also, there would be a loss of 12 jobs earning \$20,122 per job in business-to-business transactions (indirect effects).

Apart from UMHC, two ancillary economic sectors would be most significantly affected by the direct loss of 60 UMHC jobs. The Services sector would experience a loss of 16 jobs with an average wage of \$19,208. Also, the Trade sector would experience a loss of 13 jobs with an average wage of \$15,179. Although the employment impact was greatest on these sectors, the average wage per job was quite low in both sectors - indicating a moderate overall economic impact. Refer to Tables 34 and 35.

**Table 34**  
**Projected Employment Impacts of UMHC Job Reductions**  
**in Boone County, 2000**  
Assumes 100% Local Impact.

SECTOR	EMPLOYMENT			
	Direct	Indirect	Induced	TOTAL
Hospitals	-60	0	-2	-62
Agriculture	0	0	0	-1
Construction	0	-1	-1	-1
Finance, Insur & Real Estate	0	-1	-2	-3
Government	0	0	0	-1
Manufacturing	0	0	0	-1
Mining	0	0	0	0
Services	0	-7	-9	-16
Transport, Comm. & Public Utilities	0	-1	-1	-2
Trade	0	-2	-12	-13
Other	0	0	-1	-1
<b>TOTAL</b>	<b>-60</b>	<b>-12</b>	<b>-27</b>	<b>-98</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 35**  
**Projected Wage Impacts of UMHC Job Reductions**  
**in Boone County, 2000**  
Assumes 100% Local Impact.

SECTOR	WAGES			
	Direct	Indirect	Induced	TOTAL
Hospitals	-1,926,422	-245	-48,096	-1,974,762
Agriculture	0	-2,349	-1,605	-3,954
Construction	0	-13,346	-11,793	-25,139
Finance, Insur & Real Estate	0	-14,855	-47,579	-62,434
Government	0	-26,536	-18,202	-44,737
Manufacturing	0	-8,941	-10,621	-19,562
Mining	0	-15	-32	-47
Services	0	-125,490	-181,837	-307,327
Transport, Comm. & Public Utilities	0	-18,300	-30,475	-48,775
Trade	0	-31,386	-165,935	-197,321
Other	0	0	-4,206	-4,206
<b>TOTAL</b>	<b>-1,926,422</b>	<b>-241,462</b>	<b>-520,380</b>	<b>-2,688,264</b>

Source: Missouri Dept. of Higher Education and IMPLAN.



## Impacts on Central Missouri

The loss of higher education jobs in central Missouri has long-term negative economic impacts. This is ascertained by examining the difference between the baseline projection (no loss of jobs) and the scenario projection (loss of 60 jobs). The differential indicates the number of jobs above or below what would have been expected if no change in the economy had occurred.

In 2000, the loss of 60 UMHC jobs would result in the loss of 36 ancillary jobs in the Central Region - for a total loss of 96 jobs and \$3.04 million in wages across the region. By 2010, the region's economy does not recover any jobs, maintaining the loss of 96 jobs and \$3.74 million in wages.

The Services sector would be most adversely affected, losing 60 jobs (at \$34,694 per job) and \$2.49 million wages in 2000. However, by 2010 there is some recovery of jobs and wages - with the projected loss of 60 jobs and \$3.28 million in wages. In addition, the Retail Trade sector would experience a slow recovery. In 2000, the Retail Trade sector would lose 11 low wage jobs (at \$15,364 per job) and \$169,000 in wages. By 2010, the sector recovers slightly, with the loss of 10 jobs and \$184,100 in wages.

The Government sector would experience prolonged job losses over ten years. In 2000, there would only be a loss of 3 Government jobs, yet by 2010 this increases to 21 jobs lost in the Central Region. Refer to Tables 36 and 37.



**Table 36**  
**Projected Employment Impacts of UMHC Job Reductions**  
**in Central Missouri by Sector, 2000-2010**

Difference from baseline projection.

SECTOR	EMPLOYMENT		
	2000	2005	2010
Agriculture, Forestry, Fishing	0	0	0
Construction	-4	-3	-3
Finance, Insur and Real Estate	-2	-2	-2
Government	-3	-16	-21
Manufacturing - Durable	0	1	1
Manufacturing - Non-Durable	0	0	0
Mining	0	0	0
Services	-72	-63	-60
Trade - Retail	-11	-10	-10
Trade - Wholesale	-1	-1	-1
Transport, Comm. & Public Utilities	-1	-1	-1
<b>TOTAL</b>	<b>-96</b>	<b>-95</b>	<b>-96</b>

Source: Research and Planning, MO Dept. of Economic Development

**Table 37**  
**Projected Wage Impacts of UMHC Job Reductions**  
**in Central Missouri by Sector, 2000-2010**

Difference from baseline projection.

SECTOR	WAGES		
	2000	2005	2010
Agriculture, Forestry, Fishing	-3,863	-6,044	-5,880
Construction	-121,500	-118,200	-105,800
Finance, Insur and Real Estate	-68,340	-75,400	-59,870
Manufacturing - Durable	-39,460	-24,560	3,159
Manufacturing - Non-Durable	-29,150	-28,550	-12,580
Mining	-2,756	-2,271	-1,634
Services	-2,498,000	-2,899,000	-3,281,000
Trade - Retail	-169,000	-198,300	-184,100
Trade - Wholesale	-48,760	-56,680	-41,570
Transport, Comm. & Public Utilities	-60,650	-67,620	-54,780
<b>TOTAL</b>	<b>-3,042,000</b>	<b>-3,477,000</b>	<b>-3,744,000</b>

Source: Research and Planning, MO Dept. of Economic Development

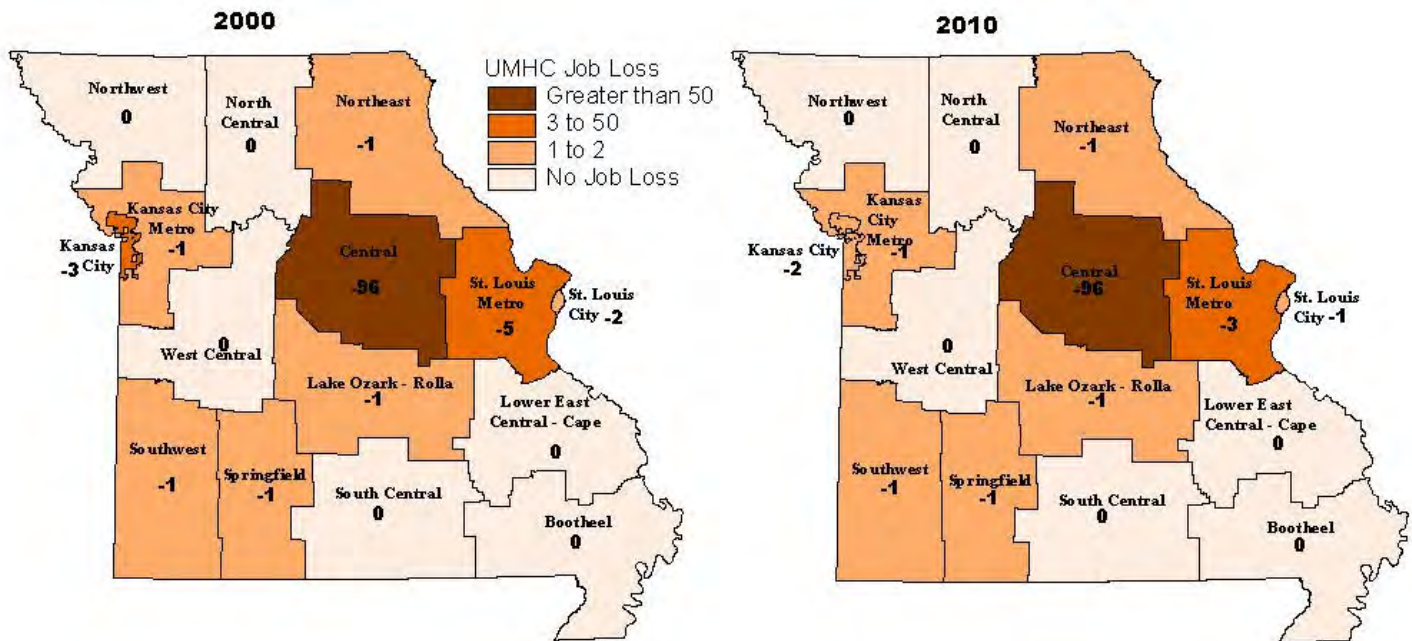
## Impacts on Missouri

The loss of 60 UMHC jobs in central Missouri has long-term negative economic impacts throughout the state's economy. In 2000, the loss of 60 UMHC jobs in the Central Region would result in the loss of 53 ancillary jobs in the state economy - for a total loss of 113 jobs across Missouri. By 2010, there is very little recover in the state economy, with the loss of 107 jobs.

As expected, the Central Region would be most adversely affected, losing 96 jobs in 2000. By 2010, the region's economy does not recover, maintaining the loss of 96 jobs.

Two other regions of the state are also marginally affected by the loss of 60 UMHC jobs in central Missouri. The St. Louis Metro Region would experience a loss of 5 jobs in 2000; and Kansas City would experience a loss of 3 jobs in 2000. However, by 2010 both regions regain a good share of these job losses, indicating a moderate recovery. Refer to Map 5.

**Map 5**  
**UMHC Job Reductions - Employment Losses by Region**



State tax revenues would also experience sharp decreases in 2000, with individual income tax revenues continuing to fall through 2010. In 2000, individual income tax revenues would fall by \$96,200, with continued declines by 2010. General sales tax revenues would fall by \$76,740 in 2000, yet recover moderately by 2010. Motor fuel sales tax revenues would fall by \$19,470 in 2000, with no recovery by 2010. Refer to Table 38.

**Table 38**  
**Projected Tax Revenue Impacts of UMHC Job Reductions in Missouri, 2000-2010**  
 Difference from baseline projection.

SECTOR	STATE TAX REVENUES		
	2000	2005	2010
Individual Income Tax	-96,200	-103,500	-107,600
Corporate Income Tax	-10,090	-8,455	-8,375
General Sales Tax	-76,740	-66,620	-65,720
Motor Fuel Sales Tax	-19,470	-19,060	-19,700

Source: Research and Planning, MO Dept. of Economic Development

Missouri would experience a small decline in population through 2010. In 2000, Missouri would lose 25 people, with over three-quarters coming from the Central Region. By 2010, this decline expands to a loss of 153 people, again with over three-quarters coming from the Central Region. Refer to Table 39.

**Table 39**  
**Projected Population Impacts of UMHC Job Reductions in Missouri by Sector, 2000-2010**  
 Difference from baseline projection.

SECTOR	POPULATION		
	2000	2005	2010
Central Region	-20	-97	-129
Missouri	-25	-119	-153

Source: Research and Planning, MO Dept. of Economic Development

In summary, the layoff of 60 workers from University of Missouri Health Care has a deleterious economic impact on Boone County and central Missouri. Luckily, this negative effect does not extend much beyond central Missouri. However, if the 300 to 350 layoffs being discussed on February 9, 2001 become final, this may have a significant negative impact on the Missouri economy.

LRS-0201-1

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